IP Communicator®
IPR5000

Users Manual

Version 1.0

Link Communications, Inc.
1035 Cerise Road
Billings, Montana 59101

Last Update: February 11, 2014

http://www.link-comm.com

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Limited Warranty

COVERAGE:

Link Communications, Inc. warrants that its products will be free from defects in materials and workmanship for a period of 12 Months (1 year) from the date of shipment. During this time, Link Communications, Inc. will cover parts, labor and return shipping. If failure is caused by instances other than manufacturing defects, Link Communications, Inc. will repair the product and bill the customer for parts and labor. Contact Link Communications, Inc. for more information.

What Link Communications, Inc. will not cover:

1. Voltage outside specifications applied to the controller.
   The IPR5000 operates at +11V to +26V, negative ground.

2. Damage to the controller by lightning, water, accident, or power surges.

3. Incorrect unit installation.

4. Damage caused by shipment (damage claims are handled by the carrier).

6. Unauthorized repairs.

THIS WARRANTY APPLIES ONLY TO THE ORIGINAL PURCHASER

HOW TO OBTAIN SERVICE
Please contact Link Communications, Inc. for servicing information and authorization.

SOFTWARE
Link Communications, Inc. holds the copyright on the IPR5000 software and hardware. Changes to the software/hardware, copying, editing, modifying and reverse engineering is prohibited.

FIRMWARE UPDATES
Link Communications, Inc. will provide firmware updates available in electronic format at the IPR5000 web site. Printed manual changes are also available from this location. Visit http://www.ip-communicator.net for additional information.

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Return Policy

These policies supersede policies appearing on all other Link Communications, Inc. literature and are in effect for purchases made after January 1, 2014.

- **Please keep all packing material and documentation in the event that your equipment has to be serviced or returned.**

- Before returning any product, you must obtain a Return Authorization (RMA) number. You can obtain this by calling (406) 245-5002.

- **No returns, of any type, will be accepted without an RMA number. Please have the following information on hand when calling for an RMA number:** customer name, invoice number, serial number, and the nature of the problem. All can be found on your invoice.

- All product to be returned must **be returned within 30 days** from the invoice date, 100% complete, and must include manuals, parts bags, and other accessories provided by the manufacturer.

- All defective products will be accepted directly by Link Communications, Inc. for credit, exchange, replacement, or repair at Link Communications, Inc.'s discretion. **After 30 days from invoice date, the manufacturer's warranty applies.**

- All non-defective returns for credit, exchange, or refund are subject to a restocking fee on the schedule listed below. No returns will be accepted beyond the 30 day period. Shipping costs are not refundable.

    - 0 to 10 days — 5% restocking
    - 11 to 20 days — 10% restocking
    - 21 to 30 days — 15% restocking

- **Link Communications, Inc. reserves the right to authorize product returns beyond 30 days from date of invoice. If the product is accepted after 30 days, credit will be issued toward FUTURE PURCHASE ONLY.**

If you have any questions — JUST ASK.

All of us have tried to make sure that this order has been shipped correctly. If we have made an error - we want to make it right. If you have a question or problem with your order, just write or call, and our staff will personally handle your situation.

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1.0 Introduction

1.1 Overview

Welcome to the IP Communicator® IPR5000. This powerful radio enables communications globally using any IP based access. The radio is a secure communications device that provides Push To Talk communications over Ethernet, WiFi, Cellular or a satellite connection that provides a globally accessed IP address.

The scope of this document is to aid in the installation, set-up, programming and basic service of the IPR5000. It is the goal of this document to address most of the questions an installer, and user might encounter. It is not the goal of this document to address every and all possible set-up combinations.

When questions arise, first refer to this manual, and if unable to locate a solution to your issue, contact Link Communications, Inc. (Link) technical support staff for resolution. Our preferred method of support is utilizing e-mail:

E-Mail support: support@link-comm.com

Telephone support is available for basic questions, theory of operation and configuration issues.

Phone support: +406-245-5002

1.2 Organization of the Users Manual

The user manual is organized in four sections.

Section 2.0: Specifications and Layout
Section 3: Setting up the IPR5000
Section 4: The Virtual IPR5000 Application

2.0: Specifications and Layout

2.1 Specifications

DC Power and Speaker:
IP67 sealed Conxall 5 pin supporting external speaker and DC power

External SMA/TNC connectors:
IP67 sealed supporting the external RF antenna options

Network and Microphone (front and back):
IP68 sealed Amphenol RJ45

External GPS Antenna connector:
IP67 sealed SMA supporting the external GPS antenna option

Rear USB Port:
IP68 sealed Samtec connector supporting user insertable USB devices for field updating the units firmware and/or loading user AES-256 bit encryption keys. When utilizing the hardware encryption module the USB port is hard-wired to the hardware crypto-module enabling key loading/management

Specifications:

Power:
+8V ~ +26V DC, 2 Amp maximum @ 12VDC input (when audio at maximum).
Ignition input providing power-down mode

External Speaker:
10W Class 'D' balanced audio output driving an 8 Ohm speaker

Hand Microphone:
Hand held speaker microphone includes PTT and Condensor microphone 300 Hz ~ 3KHz BW with support for both front or rear panel connection

Network:
10/100M 10 base T connection supporting cabled VoIP and management software

GPS:
Integrated GPS receiver utilizing external SMA connector. Provides four navigation receivers United States GPS system, Europe's GALILEO, Russia's GLONASS and Japan's QZSS

Processing:
600 MIPS based Analog Devices Blackfin running uC Linux Operating System

Display:
320 x 240 pixels 65K colors TFT Active Matrix display

VoIP CODECS:
Ophus, Speex, g.711 aLaw, g.711 uLaw , g.729 (lower bit-rate offerings in development)

VoIP Bandwidth:
8.0 kbps minimum bandwidth assuming 500mS data packets (assuming g.729 or Ophus codec)

Software Encryption:
Optional AES-256 bit encryption with user loadable keys (keys loaded from the USB connector)

Physical Size:
7 in (178mm) W x 2.15 in (55mm) H x 3.78 in (96mm) D: Weight 24 oz (680 gram)

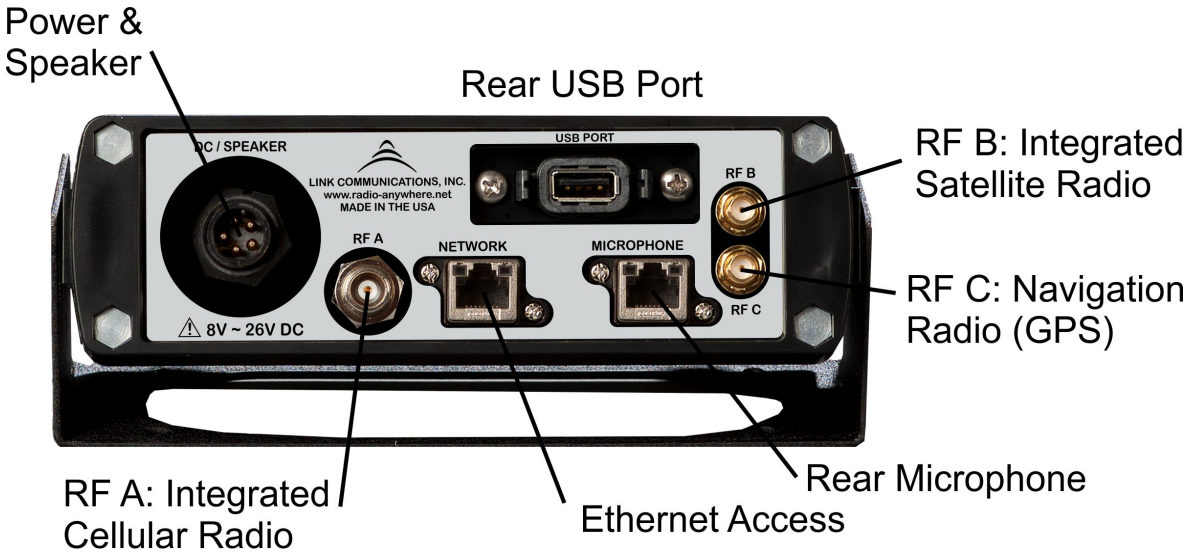
Temperature:
0°F ~ 150°F (-20°C ~ +70°C), 95% Relative Humidity

Options:

1) Internal EVDO, HSPA+ and LTE cellular options are available.
2) Internal Globalstar or Thuraya satellite interface enabling FIPS secure, satellite operation

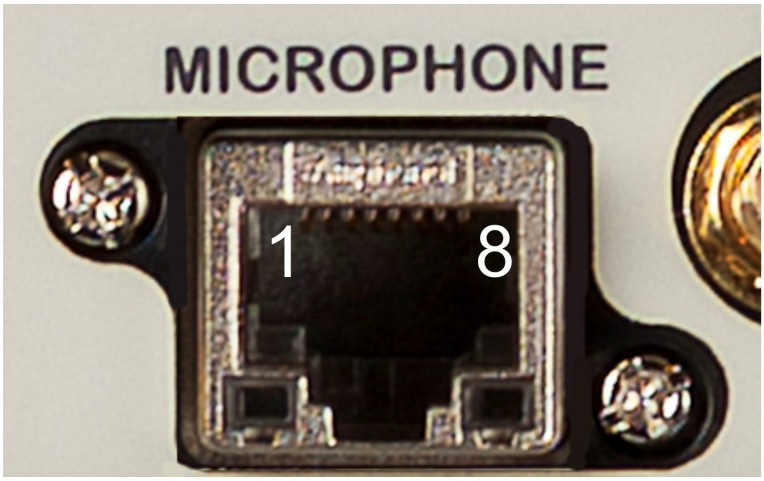
2.2 Layout

IPR5000 Front Controls



IPR5000 Rear Controls

Connector Pinouts:



1- NC
2- NC
3- Speaker 1
4- PTT Input
5- Speaker 2
6- Mic. Audio
7- +3.3V Power
8- Mic. Ground

1 - Ground
2 - Speaker 1
3 - Speaker 2
4 - Ignition
5 - Main Power

3.0: Setting up the IPR5000

There are two versions of the IPR5000, the physical mobile radio and the Virtual IPR5000 software for Windows® PCs. Except for installing/updating the software, the process of setting them up is identical.

Installing and updating the IPR5000 software

The instructions below are for the latest versions of the IPR5000 software. Please check to see if you are using the latest version before continuing.

To check which version you are using is accessed by pressing the "Settings" button and press the "Software Version" button. You can verify the software version and download current firmware from the following web site:

http://vtrunk.net/home/bIPRi

If you need to update the units firmware you will need to download the new firmware onto a USB thumb drive. Once downloaded onto the drive you can plug it into the IPR5000's rear USB connector. From the same screen you accessed allows you to install the firmware from a USB thumb drive.

****** Do not interrupt power while the update is in process. If you interrupt power you will cause the IPR5000 to stop working requiring return to the factory for recovery. ******

Use "Demo" Talk Groups

Note: The demo talk groups are supported in software version 1.08 and later. If you have earlier software, please update (see the links above) or skip this section.

Whenever a new (unregistered) IPR5000 is started and has Internet access, it will download a list of demo talk groups. These are intended to provide an easy way to sample the IPR5000's capabilities. The demo talk groups may include:

DemoWeather: a constant feed of the NOAA weather channel from Billings, MT.
DemoTone: a constant feed from a tone generator located in our office in Billings, MT.
DemoTalk: a "global" talk group that you can use to test communication between IPR5000s anywhere in the world. Just set up two IPR5000s (or two computers running the IPR5000w software), tune them both to DemoTalk, and talk. If if you have only one IPR5000, key up and ask for a signal test; there is likely to be someone monitoring that can respond.

If you do not have Internet access that can reach V-Trunk™ then only Local channels are available. This enables local communications over the local network to other IPR devices attached to the network. If your unit was previously registered and talk groups were available on your unit, they will still operate, but in a local mode using IP Multicast.

Notes on the Demo channels:
DemoTalk is a shared talk group available to all IPR5000 users; it is not private. To set up private global talk groups, the IPR5000 needs to be "registered" at vtrunk.net (see the instructions below). Once an IPR5000 is registered, the demo channels are not longer available.

How the Demo Weather and Demo Tone work:
DemoWeather and DemoTone are fed by TCB-IP2 radio gateways. If you have exiting LMR radio talk groups, they can be bridged to VTrunk (IPR5000) talk groups by connecting an LMR radio to a TCB-IP2 (actually, each TCB-IP2 can connect to two radios, bridging two talk groups). This allows IPR5000 users to communicate with LMR radio users as if they were using the same type of radio, but the IPR5000 users can be located anywhere in the world. In other words, the combination of the TCB-IP2 and IPR5000 is the ultimate range extender.

Troubleshooting Virtual IPR5000:
When the Virtual IPR5000 software (on a Windows® PC) is executed the first time, you may be prompted for permission to access the network by the Windows firewall (if it is enabled). If permission is not granted, audio reception will be sporadic, sometimes working for a few seconds then cutting out when the firewall starts blocking VoIP packets.

Talk:
Just press the PTT button on the IPR5000, it is the PTT button on the microphone, which can be plugged into the front or back of the IPR5000.

Windows® version only: On the Virtual IPR5000 software, click on the PTT button with the mouse. After clicking on the PTT button, you can also use the space bar to transmit. On the PC the local microphone and speaker attached to computer provide your communications elements for voice. If you need to change what microphone/speaker the Virtual IPR5000 uses click the gear icon in the upper right corner of the Virtual IPR5000 window to access the setup where you can select other audio devices. If you add a new audio device (such as by plugging in a USB headset), you will need to restart the Virtual IPR5000 software for the newly-connected device to be recognized.

Use "Local" Talk Groups:
The local talk groups are similar to the demo talk groups, but they work even when the IPR5000 does not have Internet access. Their range is limited, however, to other IPR5000's on the same LAN (technically those on the same multicast domain, which can be extended using a VPN).

The local channels are shared, not private, but because of their limited range you will generally not hear traffic from IPR5000's outside of your LAN. They may be useful for testing and for communicating with IPR5000's that are nearby but are registered to a different account at vtrunk.net. It is possible to disable the local talk groups for IPR5000s that have been registered.
Registering IPR5000's at www.vtrunk.net

VTrunk cloud based server:
VTrunk is a cloud-based (Internet) service that enables IPR5000's to communicate anywhere in the world that they can access the Internet.

Note: When the Internet connection for an IPR5000 is lost, it will continue to communicate with any other IPR5000s that are "local" (see the local talk groups explanation above) and will resume "global" communications when its Internet connection is restored.

Create account on www.vtrunk.net:
Before IPR5000s can be registered, you will need to create an account at http://www.vtrunk.net. Just click on "Register" and fill out the requested information. Note that there is a monthly fee for using VTrunk; make sure your email address is valid so you can be contacted to make arrangements.

Register the IPR5000s
Registering an IPR5000 associates it with the account you created in the previous step. All of the IPR5000s registered to the same account can be programmed with the same talk groups, or some talk groups can be reserved for particular IPR5000s.

To register an IPR5000, you will need to know its 8-digit registration code. It can be found by pressing the IPR5000's "Settings" button (second one down on the left), then the button labeled "Register".

Note: Units running firmware versions prior to V1.08 may also display the registration code when they are started.

Once you have the registration code:
Log onto the account you created in the previous step. Click on "Devices" in the top-right corner, then "Add Device". Enter the 8-digit registration code you noted previously.

When prompted, enter a name for that radio. The name should be something that will help you identify it, such as its location or the name of the person that will use it.

The radio will then appear in the list of devices on www.vtrunk.net.

Note that an IPR5000 can be registered to only one account at a time. If you with to register it to a different account, first log onto the original account and unregister it. The original account name is displayed as the "Owner" on the settings screen.

Set Up Private Global Talk Groups:
Once an IPR5000 has been registered, you can create your own private global talk groups.

1) Navigate to the devices page at www.vtrunk.net.

2) Click the setup gear to the left of any of the radios listed there.

3) Find the "Default" zone in the list, make sure it is turned on, then click the "Edit" button to the right.

4) Click the "Add Talk Group" button and enter the name of the talk group, then click "Add".

Repeat to add more talk groups, then click "Finish" at the bottom of the page.

5) If the new talk group does not automatically show up on the radio after a few seconds (or if you don't want to wait), on the radio go to the settings screen and select "Update Settings".

Note that by default the default zone is turned on for all radios. Also, all radios registered to the same VTrunk.net account which have the "Default" zone turned on will have access to all of the talk groups in that zone. So adding a talk group to the default zone will typically add it to all of the radios.

Set Up Additional Zones:
In the previous step, private global talk groups were added to the "Default" zone. It is possible to set up additional zones. Reasons this might be useful include:

If you have a lot of talk groups, they can be grouped into zones to make them easier to find.

Limiting access to selected talk groups. VTrunk.net provides a way to turn each zone on or off on each radio. So, for example, you could set up a zone with talk groups exclusively for managers and enable that zone only on the managers' radios.

To set up additional zones:
1) Navigate to the devices page at www.vtrunk.net.

2) Click the setup gear to the left of any of the radios listed there.

3) At the end of the list of zones, find the box that says "Zone Name". Click in it, then type a name for the zone you want to create. Then click the "Add" button to the right.

4) After the screen refreshes, the new zone should appear in the list of zones. Click on the "Edit" button to the right and continue as with the "Default" zone above.

Note: It is possible to include each talk group in multiple zones if desired.

The IPR5000 and www.vtrunk.net web site are constantly being improved; please make sure you are using the latest software version. If your IPR5000 is registered, it will automatically notify you of available updates by changing the setup icon from a gear to a yellow warning symbol. If it is not registered, you will need to manually check for updates as described above. The features under development include support for the the dispatch and emergency buttons and the contact list.

4.0: Virtual IPR5000 Application

Setting up the IPR5000

There are two versions of the IPR5000, the physical mobile radio and the Virtual IPR5000 software for Windows(tm) PCs. Except for installing/updating the software, the process of setting them up is identical.

Installing and updating the IPR5000 software

The instructions below are for the latest versions of the IPR5000 software. Please check to see if you are using the latest version before continuing.

Virtual IPR front view

Verifying your running the latest version of the firmware by pressing the settings button to call-up the settings screen.

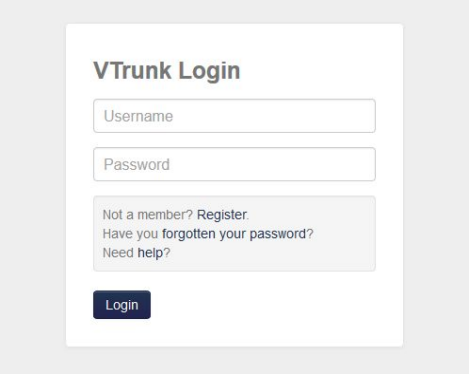
Once pressed the IPR's screen will change to show the registration status of the radio, and allow you to update the software (Virtual IPR only). To update the IPR5000 you will need to go through a couple more steps that includes a thumb drive and access to an internet enabled computer.

5.0: VTrunk™ Account Operations

VTrunk™ is the system used to globally make the IP Communicator® units communicate. There are two parts of the system, one for routing and one part for management; we will be discussing the management portion of the system.

There are distinctive steps needed to use VTrunk™ which when followed will make the creation and management of attached devices easy.

Step 1: The creation of an account on VTrunk™ which requires a valid device.
- IP Communicator® unit such as an IPR5000 or similar hardware interface
- Tactical Communications Bridge® TCB-iP2 Bridge controller
- Windows® computer running Virtual IPR5000 software
- Android device running IPR for Android application
- ...anything else that runs the IP Communicator® software



To register or access an account goto
http://www.vtrunk.net

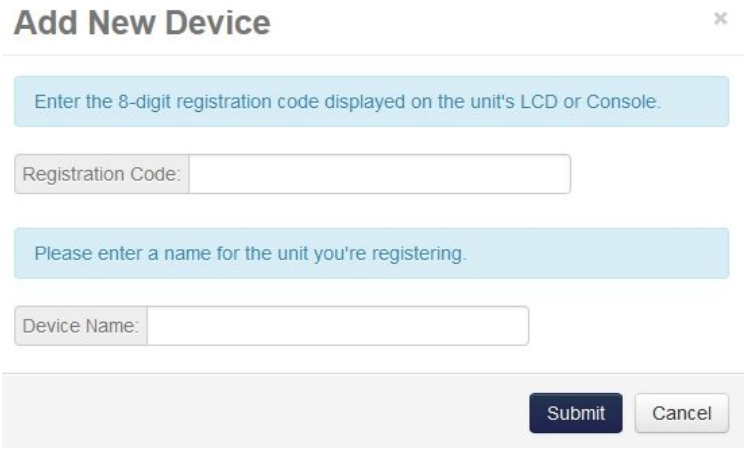
Step 2: An 8 digit unit registration code from one of your IP Communicator® units
The 8 digit unit registration code is a unique fingerprint for your device, and can only be registered and accepted if the code is correct, and if the computer or device that generated the code is attached to the internet and was able to upload the validation key to VTrunk™ .

If when registering your device you encounter the error "Invalid Registration Code", ensure the code is entered exactly as presented and that the device is attached to the internet.

Note: If your running a private server then your computer and/or IPR device needs to be able to communicate with your private server.

Once an account is generated and you have replied to the email sent from the server you can proceed to building a code plugin configuration for your system.

Once you have logged on initially you will have no devices assigned to your account. The first step is to begin adding devices by clicking on the "New Device" blue button.


Add New Device
Enter the 8-digit registration code displayed on the unit's LCD or Console.
Registration Code:
Please enter a name for the unit you're registering.
Device Name:
Submit
Cancel

After clicking on the "New Device" button you will be prompted to enter the registration code and device name.

Registration Code:
To access the registration code click the Settings Button on the screen and the code will be displayed.

The device name uniquely identify's the user of the IPR device.

For this example I will be adding a device and it will show-up in the list below the "New Device" button. When starting initially this list is empty, after adding a device it will populate with the new name.

Step 3: Setting up Zones and Talk Groups

To understand how to setup your IPR system efficiently you first need to understand the definitions for Zones and Talk Groups.

Zones: A zone is a larger umbrella term that covers several discrete groups that are under the general term of Zone. For example, the City of Billings has several services that work within the city. These services are Police, Fire, Ambulance and the Bus. The zone is called Billings, and the sub-services encompassed under the Zone are called Talk Groups.

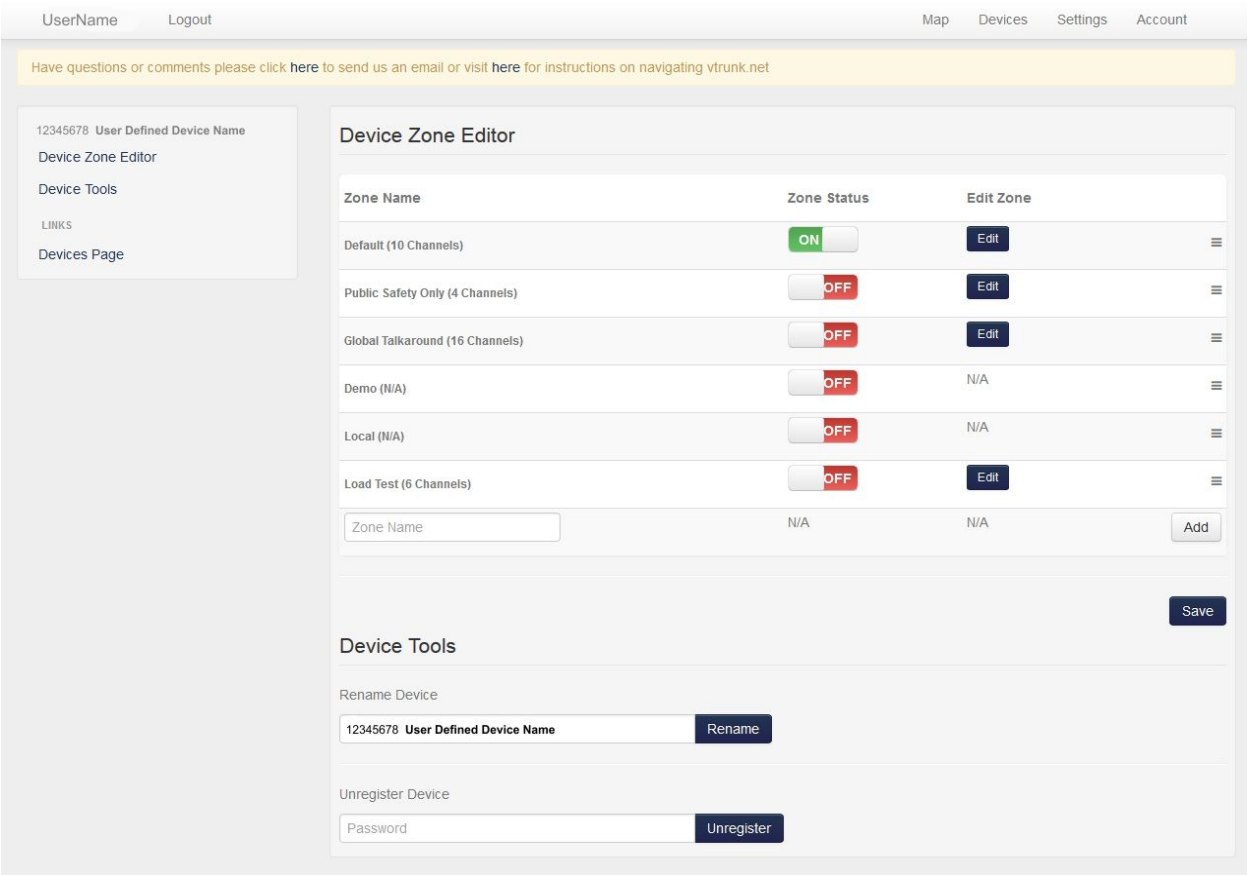
Talk Group: An organized set of resources under the Zone. So Police is a Talk Group, under the Zone of Billings. Surrounding communities would also be different Zones, with their own Talk Groups, and can all be within the same account.

This structure enables agencies to be able to easily work together when needed during situations.

Once devices are added to your account you have access to the organization and monitoring their location from the VTrunk™ website.

Managing Zones and Talk Groups:

The process to create and manage Zones and configure your Talk Groups is accessed by clicking on the "Gear" icon (located to the left of the Device ID by each user). This will invoke the Device Zone Editor which is the tool used to support your system.

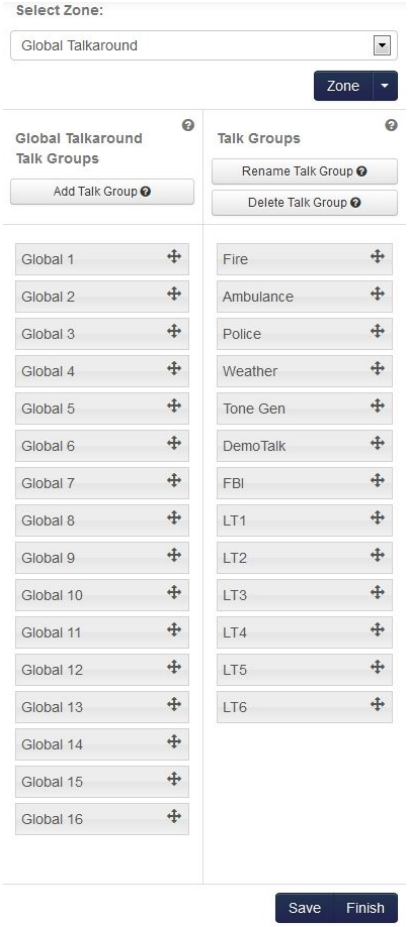


Zone Enable/Disable:

When the Device Zone Editor screen is invoked, the user can control what Zones are enabled for a specific user (the user is displayed above the Device Zone Editor display in the left of the screen). To enable or disable a specific Zone, simply click on the Zone Status Green/Red button.

When a Zone is disabled, it no longer will be available in the users radio. In the above example, currently User 12345678 only has access to the Default Zone in their radio. By clicking on the Global Talkaround Zone (turning the Zone Status Green), this Zone has now been added to the Users radio so they now have access to both the Default and now the Global Talkaround Zones.

Global Talkaround contains 16 Talkgroups labeled Global 1.. 16. When the user selects Global Talkaround Zone, they can now cycle through 16 of the channels to communicate with. This Zone is a good Zone to communicate between different account holder because it is a non-account specific Zone. It would be considered a Zone that everyone can tune to if needed.



Inside of these Zones contain a number of Talk Groups that can be tuned to once the user selects the Zone. For example, the Global Talkaround Zone contains 16 Talk Groups (see picture).

Zone Editing:
To recap, a Zone is a group that contains several talk groups, so editing a Zone will display the Talk Groups that are grouped within the Zone.

Each user has access to the Talk Groups that are enabled for them based on the Zone which the User has access to.

For Example, for User 12345678 I will create a new Zone called Planets (this is step 1). Once created the Zone Planets will show under the Device Editor as an available Zone. The Zone is disabled and initially has no Talk Groups.

Step 2 is to edit the Zone and add some Talk Groups to the list, that eventually will end up under the Planets Zone. So I click Edit and it takes me to the Edit Zone screen (see left). I will click on Add Talk Group and add some Talk Groups called Mercury, Venus, Mars, Jupiter... These Talk Groups are added to the Planets Zone automatically but are still available for the rest of the account to have access to. Press Save to save the changes made to the Talk Groups screen before you click Finish.

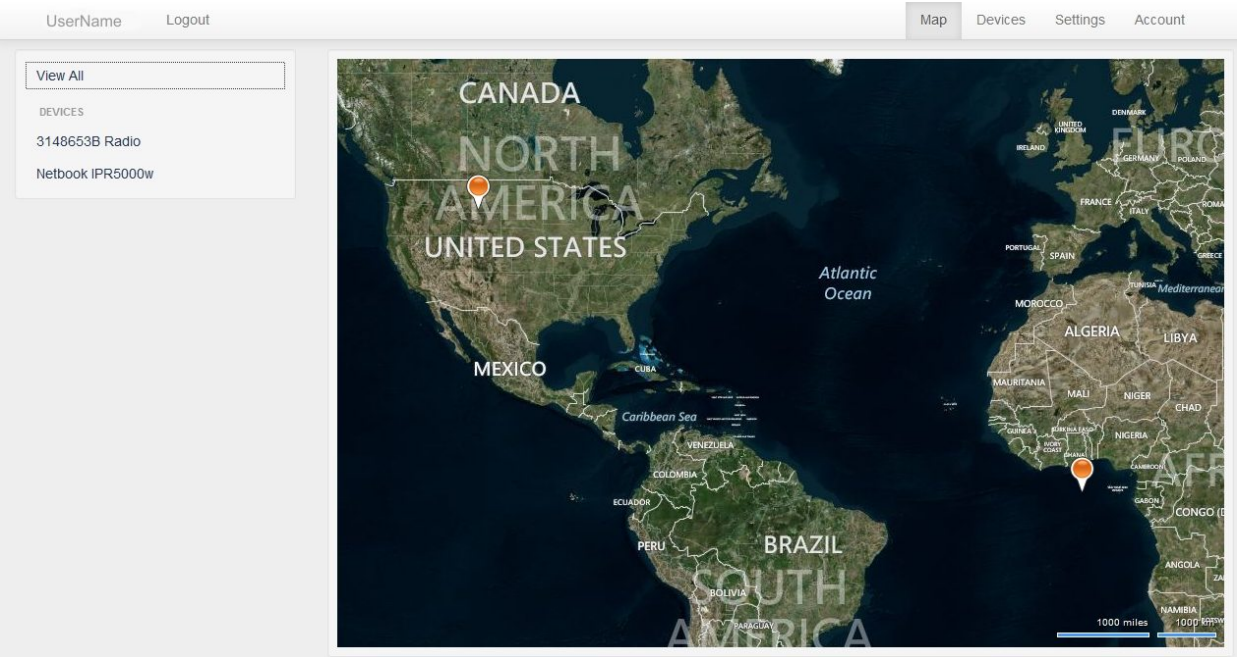
Step 3: Now the Planets Zone has several Talk Groups under it, and so far only User 12345678 has access to them, so step 3 is to go to the other users of the system and give them access to the Planets Zone (this is accomplished by clicking on the Devices Page link from the Device Zone Editor and selecting other users. Once the other user are selected then you can enable the Planets Zone for them also. Remember to click Save on the Device Zone Editor to update the changes made to the system.

Unregister a Device:

To remove a device from your account you need to Unregister the Device. This step is permanent and can only be undone by re-adding the device to your account. A device can not be a member of multiple accounts, it is uniquely registered to your account. If you no longer need and use a device you should Unregister the Device so it is no longer using up one of your accounts devices, because you are billed based on each device.

Other Tabs and available information:
Once you are logged in you can access the information by clicking on the tabs located at the top/right of the user screen.

Map:



The Map tab allows you to see the location of all your registered devices. In this example one device is located in the USA and one device is off the coast of Africa. Each IPR device has an integrated location tracking device that reports its location periodically to the management service to enable location tracking. To instantly zoom into your devices, click on the device name in the list, or View All to see all the devices at one time.

Devices:
The Devices tab shows all your devices and their Device name. Clicking on the Gear icon (located to the left of the Device ID) will enable you to set-up and assign the units Zones and Talk Groups, more on this process later.

Settings:
The Settings tab allows you to access and change the VTrunk™ router address settings. This should only be changed if you have a privately run VTrunk™ (Contact Link Communications sales for prices and options).

Account:
The Account tab allows you to change the user name and passwords that are assigned to your account. Remember to update any changes you make to your account setting to minimize the need to reset your account if lost. Link Communications does not have access to your account other than deleting it if the credentials are lost, changed or compromised.

Contact Information:

If you have any questions not answered by this short tutorial, feel free to contact us:

Link Communications, Inc.
1035 Cerise Road Billings, MT 59101
Voice: (406)245-5002
Fax: (406) 245-4889
Email: info@link-comm.com